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Title:
Closing the seasonal ocean surface temperature balance in the Eastern tropical oceans from remote sensing and model reanalyses

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Abstract:

The Eastern tropical ocean basins are regions of significant atmosphere-ocean interaction and are important to variability across subseasonal to decadal time scales. The numerous physical processes at play in these areas strain the abilities of coupled general circulation models to accurately reproduce observed upper ocean variability. Furthermore, limitations in the observing system of important terms in the surface temperature balance (e.g., turbulent and radiative heat fluxes, advection) introduce uncertainty into the analyses of processes controlling sea surface temperature variability.

This study presents recent efforts to close the surface temperature balance through estimation of the terms in the mixed layer temperature budget using state-of-the-art remotely sensed and model-reanalysis derived products. A set of twelve net heat flux estimates constructed using combinations of radiative and turbulent heat flux products — including GEWEX-SRB, ISCCP-SRF, OAFlux, SeaFlux, among several others — are used with estimates of oceanic advection, entrainment, and mixed layer depth variability to investigate the seasonal variability of ocean surface temperatures. Particular emphasis is placed on how well the upper ocean temperature balance is, or is not, closed on these scales using the current generation of observational and model reanalysis products. That is, the magnitudes and spatial variability of residual imbalances are addressed. These residuals are placed into context within the current uncertainties of the surface net heat fluxes and the role of the mixed layer depth variability in scaling the impact of those uncertainties, particularly in the shallow mixed layers of the Eastern tropical ocean basins.